

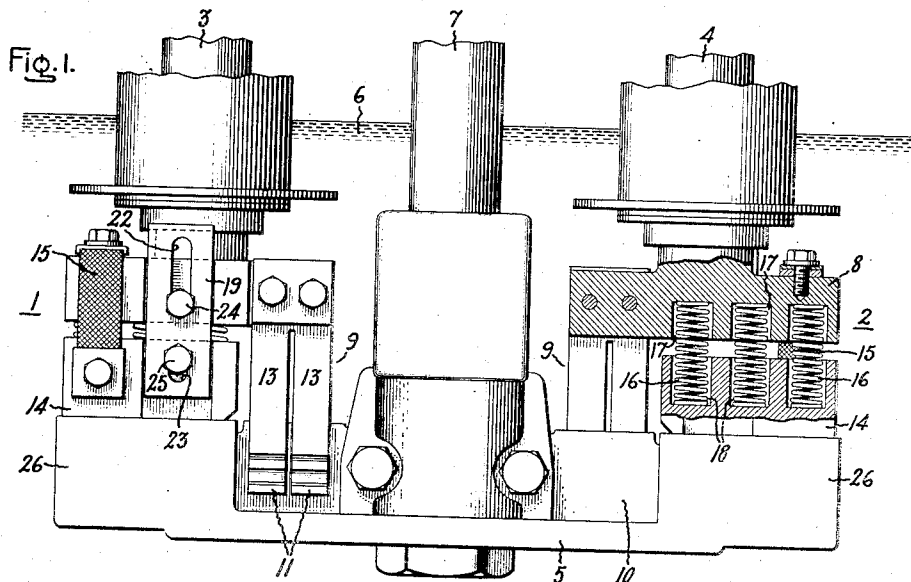
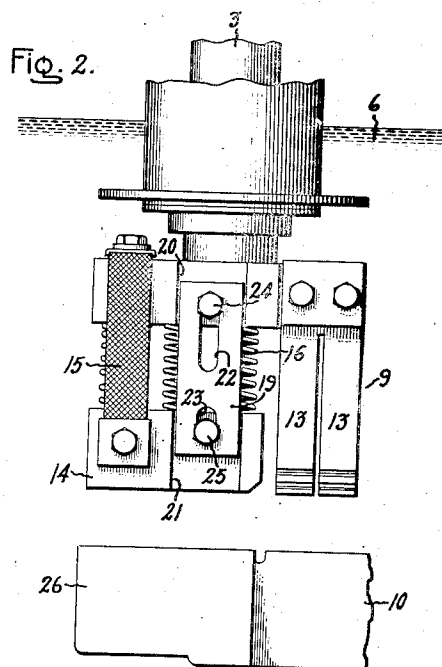
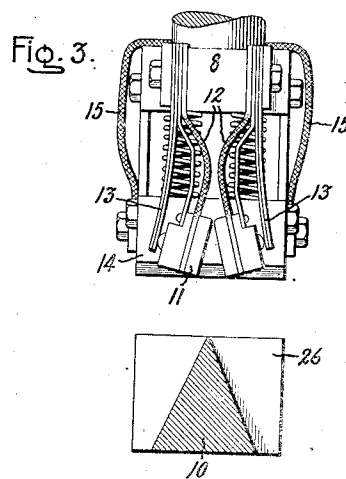
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ELECTRIC CIRCUIT INTERRUPTER

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ELECTRIC CIRCUIT INTERRUPTER

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2 Claims. (Cl. 200—146)

Our invention relates to electric circuit inter-
rupters, more particularly to those of the heavy-
duty type, as oil circuit breakers. In heavy duty
operation, as for example reversing control for
steel mill apparatus, circuit interrupters are called
upon not only efficiently to make and break a
power circuit but to withstand many heavy-cur-
rent interruptions without inspection or replace-
ment of the contact structure. Each interrup-
tion of a high intensity arc results in a certain
degree of "burning" of the contact material
which is generally copper, thereby necessitating
a rugged and arc-resisting contact structure.
Furthermore, the momentary current-carrying
capacity of the breaker, as during a short circuit
must be maintained at a high rated value.

A principal object of our invention is the pro-
vision of an improved circuit interrupter of the
aforesaid type which shall have high interrupting
and current-carrying capacities and be simple,
rugged and durable in construction.

Our invention will be more fully set forth in
the following description referring to the accom-
panying drawing, and the features of novelty
which characterize our invention will be pointed
out with particularity in the claims annexed to
and forming a part of this specification.

Referring to the drawing, Fig. 1 is an eleva-
tional view, partly in section, of circuit inter-
rupter contact structure in the closed circuit
position embodying our invention; Fig. 2 is an
elevational fragmentary view of one pole of the
circuit interrupter of Fig. 1 in the open circuit
position, and Fig. 3 is an end view, partly in sec-
tion, of the apparatus shown in Fig. 2.

Fig. 1 illustrates the fixed and movable contact
structure of an oil circuit breaker in the closed
circuit position thereof. The contact structure
comprises a pair of stationary or relatively fixed
contact structures 1 and 2 electrically connected
to the lead-in conductor studs 3 and 4, respective-
ly, of the breaker and arranged to be intercon-
nected in the closed circuit position by a movable
conducting bridging member 5. The aforesaid
contact structure is immersed in a body of suita-
ble arc-extinguishing or insulating liquid 6 and
the circuit is opened and closed by means of an
operating or lift rod 7 which is suitably connected
to the bridging member 5 for lowering and raising
the same within the oil body 6 with respect to the
stationary contact structure.

The circuit breaker in its entirety is not dis-
closed in the interest of clearness, and a detailed
description of the same is believed unnecessary
for complete understanding of the present inven-

tion other than to point out that the circuit
breaker housing or tank may, if desired, be pro-
vided with structure for effecting the well known
oil blast operation wherein the break at one end
of the bridging member is adjacent an exhaust
passage of a pressure-confining chamber in which
the contact structure is disposed, so that arcing
pressure generated at the other break is effective
to direct a blast of oil through the arc at the first-
named break.

The stationary contact structure of each pole of
the circuit breaker comprises an adapter 8 of
conducting material supported by and electrically
connected to the associated conductor stud, and
contact members which are connected to and
carried by the adapter. For the purpose of
conducting heavy currents through the breaker,
finger contact members 9 are secured to one por-
tion of the adapter so as to be engaged and
spread apart by a coacting wedge-shaped con-
tact portion 10 of the movable bridging member
5 as best illustrated by Fig. 3. This clearly in-
volves a wiping action tending to maintain clean
the contact surfaces. The finger contact mem-
bers 9 may be of any suitable and well known
construction including a pair of opposed contact
portions 11 electrically connected, as by flexible
leads 12, to the adapter 8 and biased towards
each other as by leaf springs 13 likewise connect-
ed to the adapter 8. In the closed circuit posi-
tion illustrated by Fig. 1, the contact portions 11
are biased into good contact engagement with the
opposite sides of the wedge-shaped contact por-
tion 10, with the result that high currents may
traverse the contact structure without overheating
or damage to the breaker.

In case of interruption of heavy currents we
have found that comparatively massive butt con-
tact structure used in conjunction with the afore-
said finger-type contacts above described results
in greatly improved operation of the breaker. To
this end each adapter is connected to and sup-
ports a comparatively massive butt contact mem-
ber 14 comprising in the present instance a block
of suitable contact material, as copper, which is
electrically connected to the adapter as by flexible
braided conductors 15 and is resiliently mounted
with respect thereto as by compression springs 16
which are seated within sockets 17 and 18 of the
adapter and butt contact, respectively. As best
illustrated by Fig. 2, the butt contact 14 is guided
for limited reciprocal movement by means of a
pair of bars or plates 19, each bar being mounted
in aligned slots 20 and 21 and having slots 22 and

23 coacting with pins 24 and 25 affixed to the adapter and butt contact, respectively.

Referring particularly to Fig. 3, the butt contact member 14 is provided with a plane contact surface arranged to be engaged by a corresponding butt contact member 26 forming an extremity of the bridging member 5. The contact portion 26 is likewise of comparatively massive structure and may be in the form of a solid block of conducting material as copper.

Upon initiation of the circuit opening movement and subsequent to separation of the current-carrying contacts 9 and 10, the butt contacts 14 and 26, which serve as the arcing contacts, are maintained in good contact engagement by the follow-up action of compression springs 16 and also by the attractive influence of the magnetic fields set up by parallel currents flowing in a generally horizontal direction through the large contact surfaces of the butt contacts 14 and 26. There is, therefore, no arcing at the finger contacts, as more clearly indicated by Fig. 3, so that the contact surfaces thereof are unimpaired for heavy current duty. The arcing between the butt contacts 14 and 26 may be interrupted in any suitable manner, as by the oil blast method previously described.

The comparatively massive structure of the arcing contacts not only provides a large heat dissipating surface but also provides an adequate amount of contact material for the arcing contacts even after a great many circuit interrupting operations. It will be apparent from the drawing that the heat dissipating surface of each contact portion 14 and 26 is comparable to or greater than that of a wedge-shaped contact 10. By way of example, we have found that a circuit interrupter embodying our invention has a contact life of the order of approximately fifteen times longer than previous contact constructions.

Upon closing of the circuit interrupter by upward movement of the bridging member 5, butt contacts 14 and 26 first engage, comprising the springs 16, and thereby maintaining high pressure contact for carrying heavy currents from the instant of contact closing to the final engagement of contacts 9 and 10.

It should be understood that our invention is not limited to specific details of construction and arrangement thereof herein illustrated, and that changes and modifications may occur to one skilled in the art without departing from the spirit of our invention,

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An electric circuit interrupter comprising a pair of fixed contacts, each of said contacts including an adapter, opposed finger contacts for carrying heavy currents connected to said adapter, and a comparatively massive arcing contact block mounted for lost motion with respect to said adapter and means including springs seated in recesses in said adapter and block contact resiliently biasing said butt contacts away from said adapter, and a movable bridging member for interconnecting said fixed contacts having a centrally positioned lift rod, wedge-shaped contact portions disposed at opposite sides of said lift rod for engaging said finger contacts, and block-like arcing butt contact portions likewise massive as compared with the current carrying contacts at the extremities of said bridging member for engaging the first-named block contacts, said first-named butt contacts and said block-like contact portions each having a heat dissipating surface comparable to or greater than that of one of said wedge-shaped contact portions, said resilient means maintaining said block contacts in engagement subsequent to separation of said finger and wedge contact portions.

2. An electric circuit interrupter comprising a pair of fixed contacts, each of said contacts including an adapter, finger contacts for normally carrying heavy currents connected to said adapter, an arcing contact comprising a block massive as compared with said finger contacts, a pair of guide plates at opposite sides of said block connected respectively to said block and adapter, said plates having a pin and slot connection with respect to said adapter, a flexible conductor electrically connecting said adapter to said block contact and means positioned between said guide plates resiliently biasing said block contact away from said adapter, and a movable bridging member for interconnecting said fixed contacts having a centrally positioned lift rod, wedge-shape contact portions disposed at opposite sides of said lift rod for engaging said finger contacts, and block-like arcing butt contact portions likewise massive as compared with the current carrying contacts at the extremities of said bridging member for engaging the first named block contacts.

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